

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

1.-22. (Cancelled)

23. (Currently amended) A method for characterizing a chemical mechanical polishing process, the method comprising:

embedding one or more electrical resistance members within a semiconductor wafer with integrated circuit features, wherein embedded electrical resistance members are isolated from one another;

chemically mechanically polishing the wafer;

gathering one or more pieces of electrical resistance information related to the chemical mechanical polishing process from the one or more electrical resistance members; and

analyzing the one or more pieces of electrical resistance information to characterize the chemical mechanical polishing process.

24. (Original) The method of claim 23 wherein the one or more pieces of electrical resistance information are gathered from the one or more electrical resistance members at least one of before, during and after chemically mechanically polishing the one or more wafers.

25. (Original) The method of claim 24 wherein the electrical resistance information comprises at least one of a starting electrical resistance, one or more electrical resistances recorded at one or more times during the chemical mechanical polishing process, one or more electrical resistances recorded after one or more passes of a polishing pad during the chemical mechanical polishing process and one or more electrical resistances recorded after one or more percentages of one or more layers have been removed during the chemical mechanical polishing process.
26. (Original) The method of claim 23 comprising gathering at least one of pad information, slurry information, pressure information and motion information associated with the chemical mechanical polishing process.
27. (Original) The method of claim 26, the pad information comprising at least one of the number of wafers polished with a pad and the stiffness of the pad.
28. (Original) The method of claim 26, the slurry information comprising at least one of the solids concentration in the slurry, the components of the slurry, the pH of the slurry, the dispense rate of the slurry, the particle size of the slurry and the particle density of the slurry.
29. (Original) The method of claim 26, the pressure information comprising at least one of an initial pressure, an average pressure, a minimum pressure and a maximum pressure.
30. (Previously presented) The method of claim 26, the motion information comprising at least one of a motion type, an initial speed, an average speed, a minimum speed and a maximum speed.

31. (Original) The method of claim 23, further comprising producing a relation between at least one of the pad information, the slurry information, the pressure information, the motion information and the electrical resistance information.

32. (Original) The method of claim 31, further comprising initializing at least one of a chemical mechanical polishing process and apparatus based, at least in part, on at least one of the electrical resistance information, the pad information, the slurry information, the pressure information, the motion information and one or more relations between the electrical resistance information, the pad information, the slurry information, the pressure information and the motion information.

33. (Original) The method of claim 32 comprising controlling at least one of a chemical mechanical polishing process and apparatus based, at least in part, on at least one of the electrical resistance information, the pad information, the slurry information, the pressure information, the motion information, an incoming monitored electrical resistance data and one or more relations between the electrical resistance information, the pad information, the slurry information, the pressure information, the motion information and the incoming monitored electrical resistance data.

34.-40. (Cancelled)

41. (Currently amended) A method for controlling a chemical mechanical polishing process, the method comprising:

isolating a plurality of electrical resistance members within different layers of a semiconductor wafer with integrated circuit features, wherein the plurality of electrical resistance members are coupled to form an individual electrical resistance entity across the disparate layers;

chemically mechanically polishing the wafer;

gathering one or more pieces of electrical resistance information related to the chemical mechanical polishing process from the plurality of electrical resistance members; and

analyzing the one or more pieces of electrical resistance information to control the chemical mechanical polishing process.

42. (Previously presented) The method of claim 41 wherein the one or more pieces of electrical resistance information are gathered from the plurality of electrical resistance members at least one of before, during and after chemically mechanically polishing the one or more wafers.

43. (Previously presented) The method of claim 42 wherein the electrical resistance information comprises at least one of a starting electrical resistance, one or more electrical resistances recorded at one or more times during the chemical mechanical polishing process, one or more electrical resistances recorded after one or more passes of a polishing pad during the chemical mechanical polishing process and one or more electrical resistances recorded after one or more percentages of one or more layers have been removed during the chemical mechanical polishing process.

44. (Previously presented) The method of claim 41 comprising gathering at least one of pad information, slurry information, pressure information and motion information associated with the chemical mechanical polishing process.

45. (Previously presented) The method of claim 44, the pad information comprising at least one of the number of wafers polished with a pad and the stiffness of the pad.

46. (Previously presented) The method of claim 44, the slurry information comprising at least one of the solids concentration in the slurry, the components of the slurry, the pH of the slurry, the dispense rate of the slurry, the particle size of the slurry and the particle density of the slurry.
47. (Previously presented) The method of claim 44, the pressure information comprising at least one of an initial pressure, an average pressure, a minimum pressure and a maximum pressure.
48. (Previously presented) The method of claim 44, the motion information comprising at least one of a motion type, an initial speed, an average speed, a minimum speed and a maximum speed.
49. (Previously presented) The method of claim 41, further comprising producing a relation between at least one of the pad information, the slurry information, the pressure information, the motion information and the electrical resistance information.
50. (Previously presented) The method of claim 49, further comprising initializing at least one of a chemical mechanical polishing process and apparatus based, at least in part, on at least one of the electrical resistance information, the pad information, the slurry information, the pressure information, the motion information and one or more relations between the electrical resistance information, the pad information, the slurry information, the pressure information and the motion information.

51. (Previously presented) The method of claim 50 comprising controlling at least one of a chemical mechanical polishing process and apparatus based, at least in part, on at least one of the electrical resistance information, the pad information, the slurry information, the pressure information, the motion information, an incoming monitored electrical resistance data and one or more relations between the electrical resistance information, the pad information, the slurry information, the pressure information, the motion information and the incoming monitored electrical resistance data.

52. (Currently amended) A method for characterizing a chemical mechanical polishing process, the method comprising:

forming at least two electrical resistance members in different directions within a layer of a semiconductor wafer with integrated circuit features, wherein the electrical resistance members are electrically isolated from one another;

chemically mechanically polishing the wafer;

gathering one or more pieces of electrical resistance information related to the chemical mechanical polishing process from the electrical resistance members;

analyzing the one or more pieces of electrical resistance information to characterize the chemical mechanical polishing process; and

producing a relation between at least one of the pad information, the slurry information, the pressure information, the motion information and the electrical resistance information.

53. (Previously presented) The method of claim 52 wherein the one or more pieces of electrical resistance information are gathered from the electrical resistance members at least one of before, during and after chemically mechanically polishing the one or more wafers.

54. (Previously presented) The method of claim 53 wherein the electrical resistance information comprises at least one of a starting electrical resistance, one or more electrical resistances recorded at one or more times during the chemical mechanical polishing process, one or more electrical resistances recorded after one or more passes of a polishing pad during the chemical mechanical polishing process and one or more electrical resistances recorded after one or more percentages of one or more layers have been removed during the chemical mechanical polishing process.
55. (Previously presented) The method of claim 52 comprising gathering at least one of pad information, slurry information, pressure information and motion information associated with the chemical mechanical polishing process.
56. (Previously presented) The method of claim 55, the pad information comprising at least one of the number of wafers polished with a pad and the stiffness of the pad.
57. (Previously presented) The method of claim 55, the slurry information comprising at least one of the solids concentration in the slurry, the components of the slurry, the pH of the slurry, the dispense rate of the slurry, the particle size of the slurry and the particle density of the slurry.
58. (Previously presented) The method of claim 55, the pressure information comprising at least one of an initial pressure, an average pressure, a minimum pressure and a maximum pressure.
59. (Previously presented) The method of claim 55, the motion information comprising at least one of a motion type, an initial speed, an average speed, a minimum speed and a maximum speed.

60. (Previously presented) The method of claim 52, further comprising initializing at least one of a chemical mechanical polishing process and apparatus based, at least in part, on at least one of the electrical resistance information, the pad information, the slurry information, the pressure information, the motion information and one or more relations between the electrical resistance information, the pad information, the slurry information, the pressure information and the motion information.

61. (Previously presented) The method of claim 60 comprising controlling at least one of a chemical mechanical polishing process and apparatus based, at least in part, on at least one of the electrical resistance information, the pad information, the slurry information, the pressure information, the motion information, an incoming monitored electrical resistance data and one or more relations between the electrical resistance information, the pad information, the slurry information, the pressure information, the motion information and the incoming monitored electrical resistance data.